LIQUID CRYSTAL DISPLAY DEVICE . . .
Takeda et al.
Greer, Burns & Crain, Ltd. (Patrick Burns)
Ref. No. 1117.68339
Sheet 1 of 27 (312) 360 0080

FIG. 1

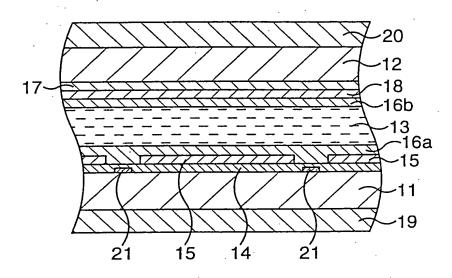


FIG. 2A

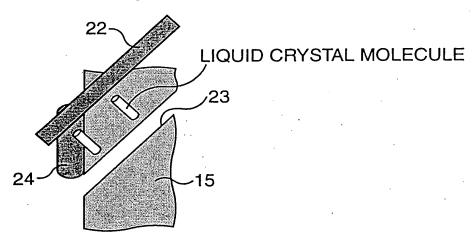


FIG. 2B

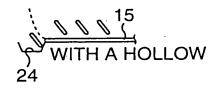


FIG. 2C

DARK LINE

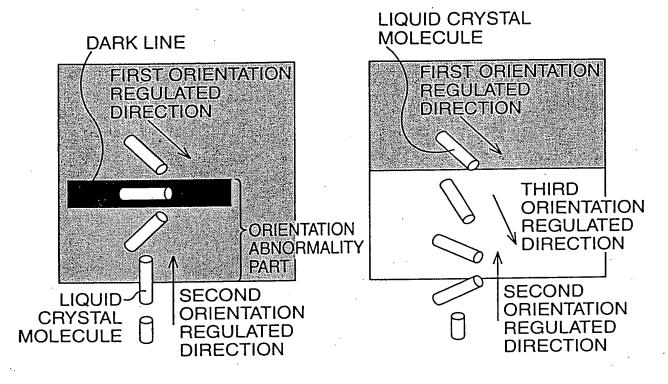
15

WITHOUT A HOLLOW

LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339
Sheet 2 of 27 (312) 360 0080



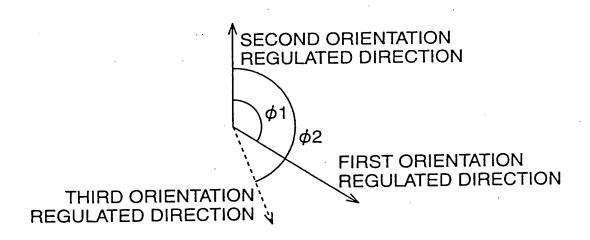
FIG. 3B



CONVENTIONAL

GIVE A THIRD REGULATING FORCE

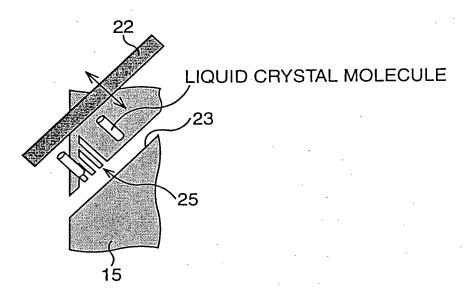
FIG. 3C



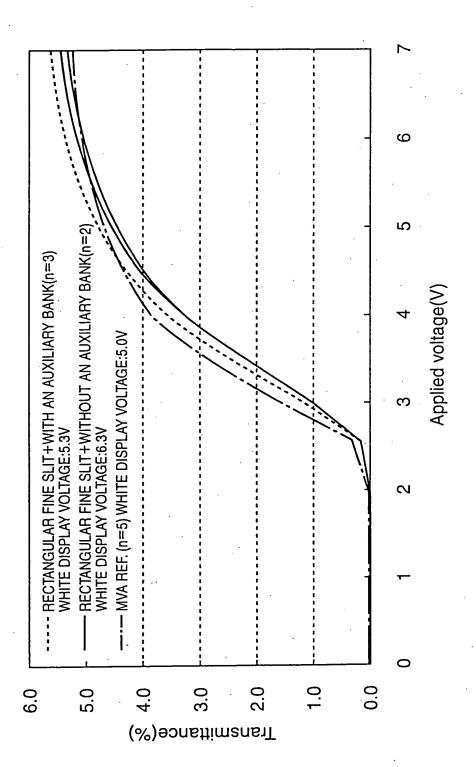
RELATION BETWEEN DIRECTIONS OF ALIGNING FORCE AND ANGLES

LIQUID CRYSTAL DISPLAY DEVICE . . .
Takeda et al.
Greer, Burns & Crain, Ltd. (Patrick Burns)
Ref. No. 1117.68339
Sheet 3 of 27 (312) 360 0080

FIG. 4







LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339
Sheet 5 of 27 (312) 360 0080

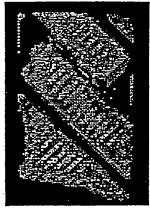
FIG. 6A

FIG. 6B

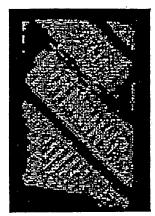
FIG. 6C



APPLIED VOLTAGE: 3V



APPLIED VOLTAGE: 4V



APPLIED VOLTAGE: 5V

FIG. 6D

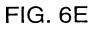
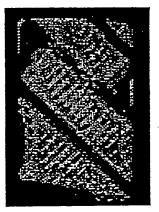


FIG. 6F



APPLIED VOLTAGE : 6V



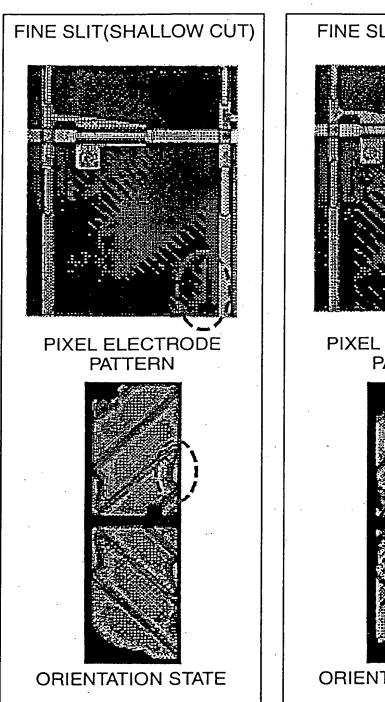
APPLIED VOLTAGE : 7V

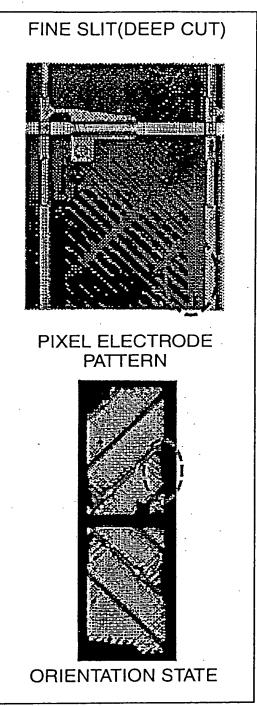


APPLIED VOLTAGE : 8V

LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339 Sheet 6 of 27 (312) 360 0080

FIG. 7





LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns Ref. No. 1117.68339
Sheet 7 of 27 (312) 360 0080

FIG. 8

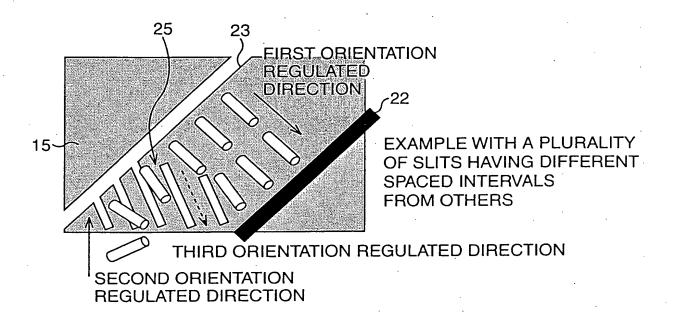
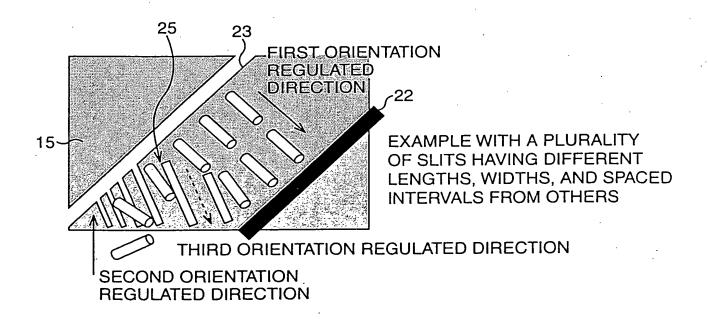
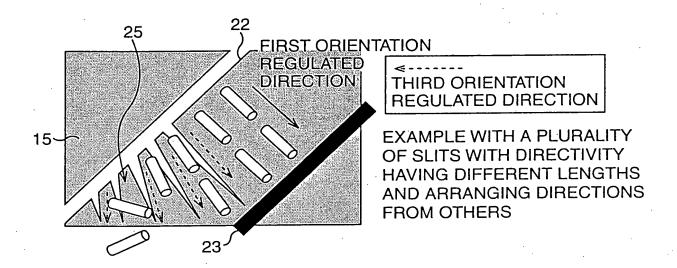


FIG. 9



LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339
Sheet 8 of 27 (312) 360 0080

FIG. 10



LIQUID CRYSTAL DISPLAY DEVICE . . .
Takeda et al.
Greer, Burns & Crain, Ltd. (Patrick Burns)
Ref. No. 1117.68339
Sheet 9 of 27 (312) 360 0080

FIG. 11

. . . .

	①WITH AN AUXILIARY BANK	②WITHOUT AN AUXILIARY BANK	③CHANGE THE DIRECTION OF AN AUXILIARY BANK
STRUCTURE	PROTRUSION OF SUBSTRATE  PIXEL ELECTRODE ON TFT SUBSTRATE	DARK LINE	
TRANSMITTANCE	1	0.9	0.95
MISALIGNMENT MARGIN	<b>×</b>	0	Δ.
FEATURES	·LIQUID CRYSTAL ORIENTATION OF A PIXEL EDGE CHANGES GREATLY DUE TO DEVIATION AMONG EACH SHOT AND IN PASTING (A LARGE DEGREE OF TRANSMITTANCE CHANGE) ·NO DARK LINE ON A PIXEL EDGE (A LARGE DEGREE OF IMPROVEMENT IN TRANSMITTANCE)	·LIQUID CRYSTAL ORIENTATION OF A PIXEL EDGE CHANGES DUE TO DEVIATION AMONG EACH SHOT AND IN PASTING (TO A SMALL DEGREE) ·OCCURRENCE OF ONE DARK LINE ON A PIXEL EDGE (A LARGE DEGREE OF DECREASE IN TRANSMITTANCE)	·LIQUED CRYSTAL ORIENTATION OF A PIXEL EDGE CHANGES DUE TO DEVIATION AMONG EACH SHOT AND IN PASTING ·NO DARK LINE ON A PIXEL EDGE

LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339 Sheet 10 of 27 (312) 360 0080

FIG. 12

	@HOLLOW IN A PIXEL EDGE	⑤FINE SLITS +CONNECTION AT THE END
STRUCTURE	HOLLOW	CONNECTION
TRANSMITTANCE	0.92	0.95
MISALIGNMENT MARGIN	0	©
FEATURES	·LIQUID CRYSTAL ORIENTATION OF A PIXEL EDGE CHANGES DUE TO DEVIATION AMONG EACH SHOT AND IN PASTING (WITH A MARGIN) ·NO DARK LINE ON A PIXEL EDGE	·LIQUID CRYSTAL ORIENTATION DOES NOT CHANGE EASILY DUE TO DEVIATION AMONG EACH SHOT AND IN PASTING (WITH THE LARGEST MARGIN) ·NO DARK LINE AT A PIXEL EDGE (TRANSMITTANCE UNDER IMPROVEMENT) ·TRANSMITTANCE IS IMPROVED GREATLY AT A DRIVING VOLTAGE OF 6V OR HIGHER (EQUAL TO ①)

LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339 Sheet 11 of 27 (312) 360 0080

FIG. 13

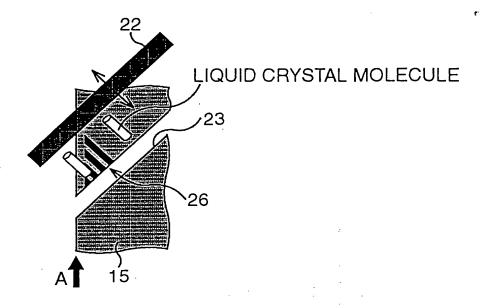


FIG. 14A

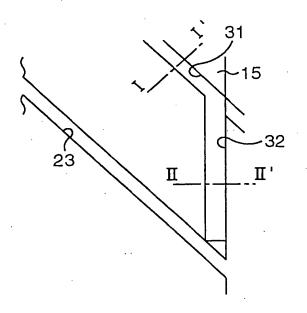
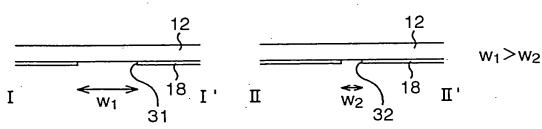


FIG. 14B



LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339 Sheet 12 of 27 (312) 360 0080

FIG. 15A

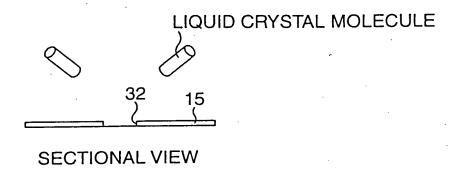
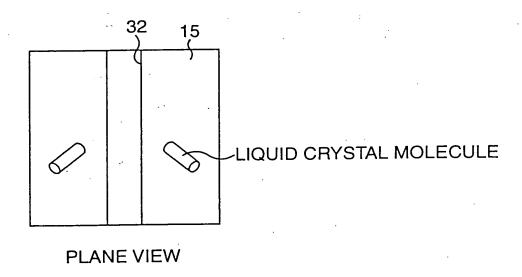


FIG. 15B



LIQUID CRYSTAL DISPLAY DEVICE . . .
Takeda et al.
Greer, Burns & Crain, Ltd. (Patrick Burns)
Ref. No. 1117.68339
Sheet 13 of 27 (312) 360 0080

FIG. 16A

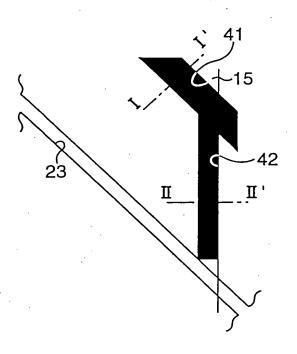
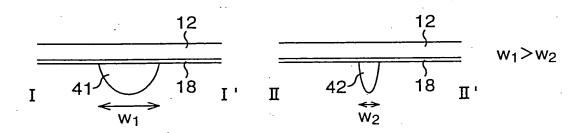


FIG. 16B



LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339 Sheet 14 of 27 (312) 360 0080

FIG. 17A

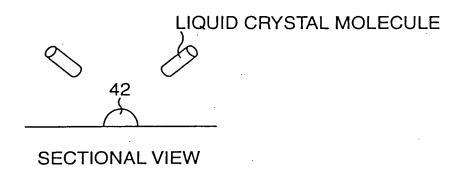
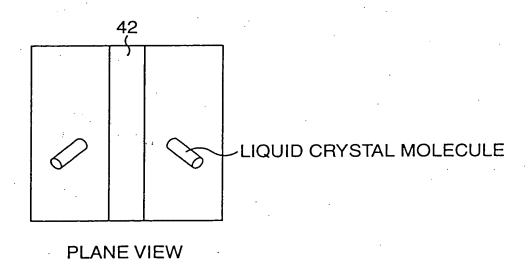
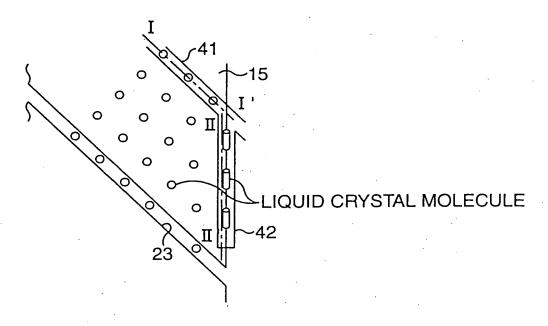


FIG. 17B



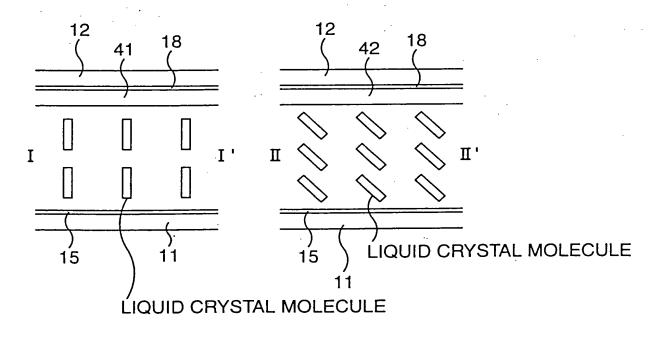
LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339
Sheet 15 of 27 (312) 360 0080

FIG. 18A



**PLANE VIEW** 

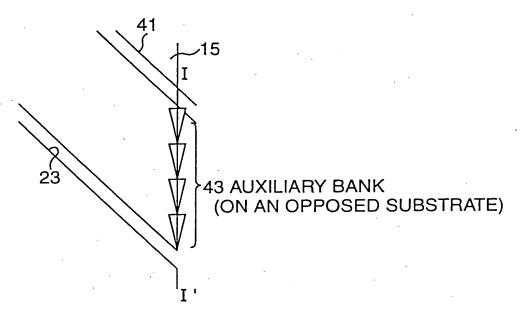
FIG. 18B



**SECTIONAL VIEW** 

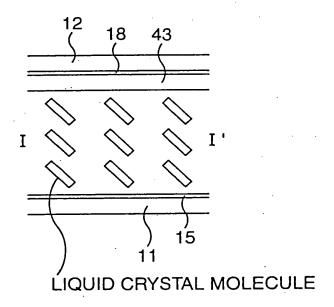
LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339 Sheet 16 of 27 (312) 360 0080

FIG. 19A



**PLANE VIEW** 

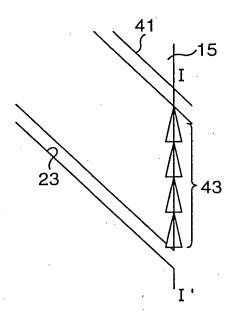
FIG. 19B



SECTIONAL VIEW

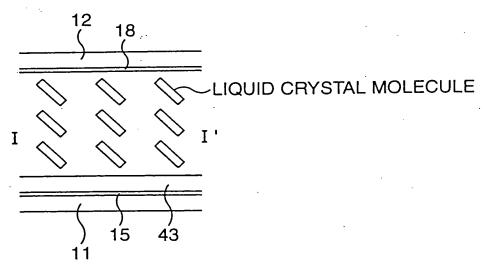
LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339 Sheet 17 of 27 (312) 360 0080

FIG. 20A



PLANE VIEW

FIG. 20B



SECTIONAL VIEW

LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339
Sheet 18 of 27 (312) 360 0080

FIG. 21A

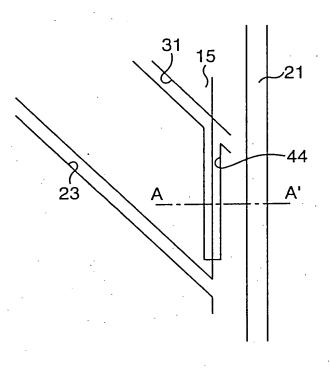
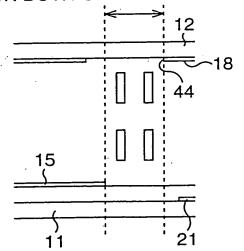


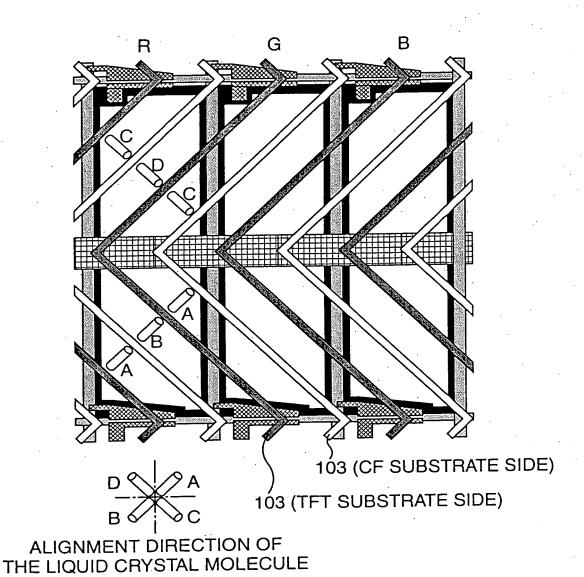
FIG. 21B

## A REGION WITH NO ELECTRODE ON BOTH OF THE SUBSTRATES



LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339 Sheet 19 of 27 (312) 360 0080

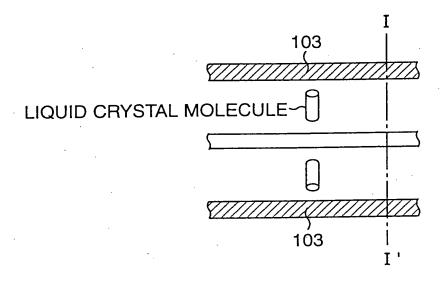
FIG. 22



PIXEL STRUCTURE OF AN MVA LIQUID CRYSTAL DISPLAY (ONE PIXEL)

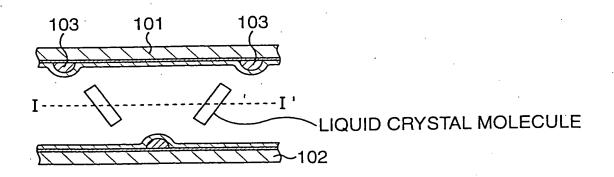
LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al.
Greer, Burns & Crain, Ltd. (Patrick Burns)
Ref. No. 1117.68339
Sheet 20 of 27 (312) 360 0080

FIG. 23A



PLANE VIEW

FIG. 23B



LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339 Sheet 21 of 27 (312) 360 0080

FIG. 24A

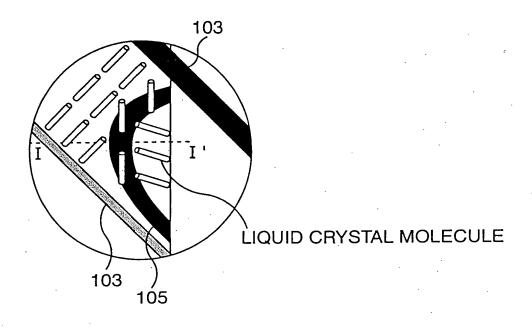
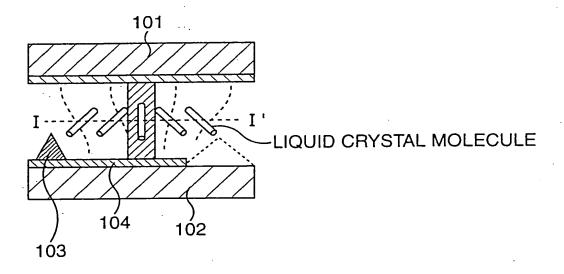
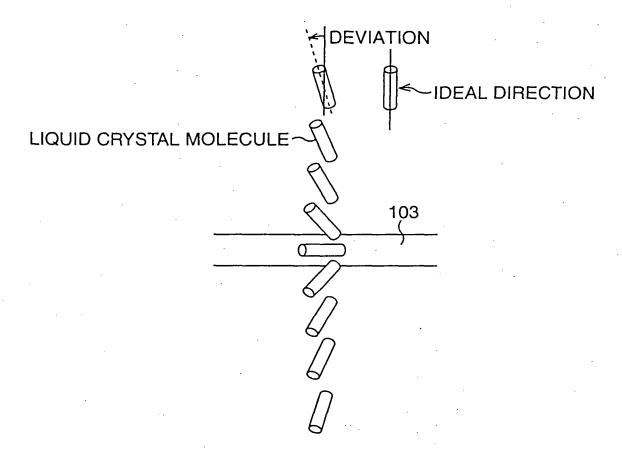


FIG. 24B



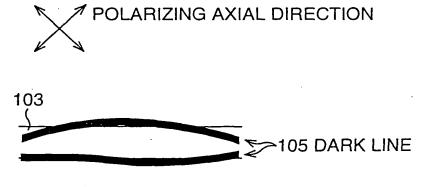
LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339 Sheet 22 of 27 (312) 360 0080

FIG. 25A



ALIGNMENT DIRECTION OF THE LIQUID CRYSTAL MOLECULE

FIG. 25B



**OPTICAL APPEARANCE** 

LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339 Sheet 23 of 27 (312) 360 0080

FIG. 26A

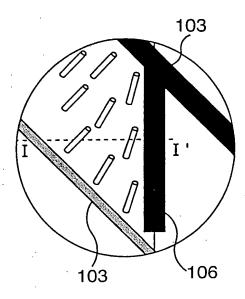
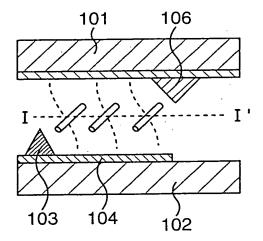
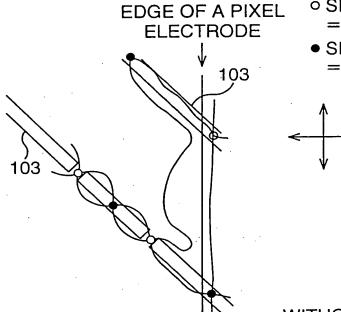


FIG. 26B



LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al. Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1117.68339
Sheet 24 of 27 (312) 360 0080

## FIG. 27A

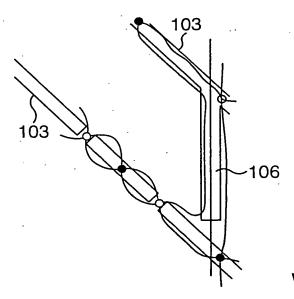


- SINGULAR POINTS OF S
   -1 ORIENTATION VECTOR
- SINGULAR POINTS OF S =+1 ORIENTATION VECTOR



WITHOUT AN AUXILIARY BANK

FIG. 27B



WITH AN AUXILIARY BANK

LIQUID CRYSTAL DISPLAY DEVICE . . .
Takeda et al.
Greer, Burns & Crain, Ltd. (Patrick Burns)
Ref. No. 1117.68339
Sheet 25 of 27 (312) 360 0080

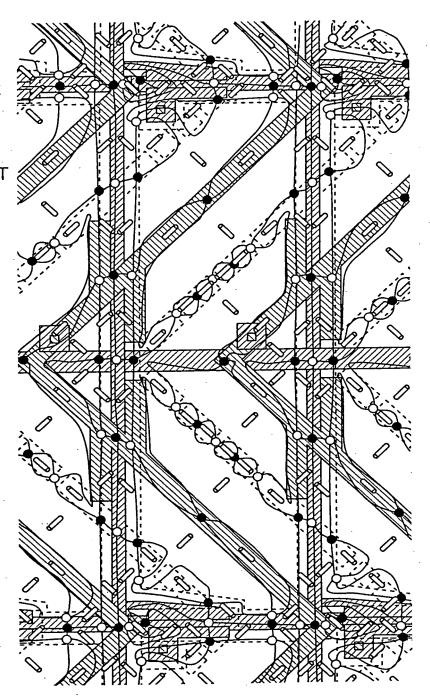
FIG. 28

STRENGTH OF SINGULAR POINTS OF ORIENTATION VECTOR

●S=+1

OS=-1

OBSERVED WITH A TFT SUBSTRATE ON A LOWER SIDE AND A CF SUBSTRATE ON AN UPPER SIDE



LIQUID CRYSTAL DISPLAY DEVICE . . . Takeda et al.
Greer, Burns & Crain, Ltd. (Patrick Burns)
Ref. No. 1117.68339
Sheet 26 of 27 (312) 360 0080

FIG. 29A

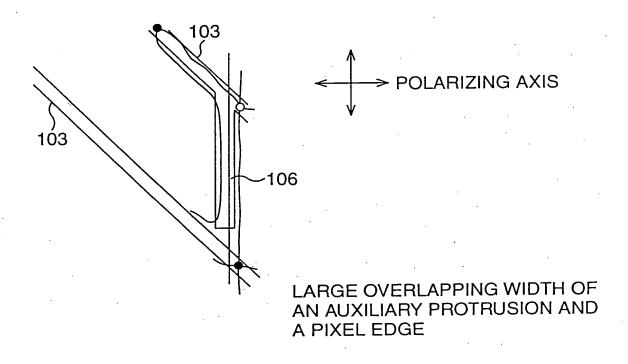
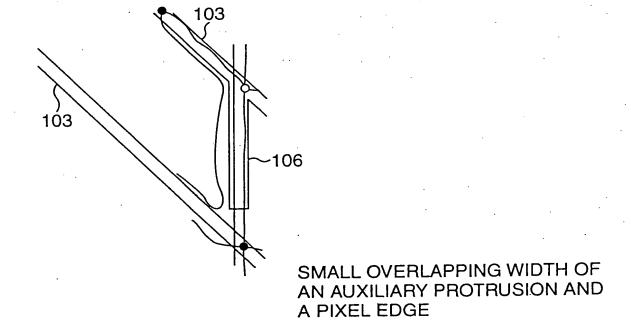
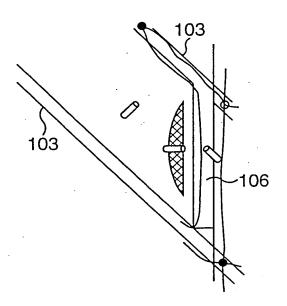


FIG. 29B



LIQUID CRYSTAL DISPLAY DEVICE . . .
Takeda et al.
Greer, Burns & Crain, Ltd. (Patrick Burns)
Ref. No. 1117.68339
Sheet 27 of 27 (312) 360 0080

FIG. 30





LARGE OVERLAPPING WIDTH OF AN AUXILIARY BANK AND A PIXEL (LARGER THAN THAT OF UPPER CASES SHOWN IN FIG.7)